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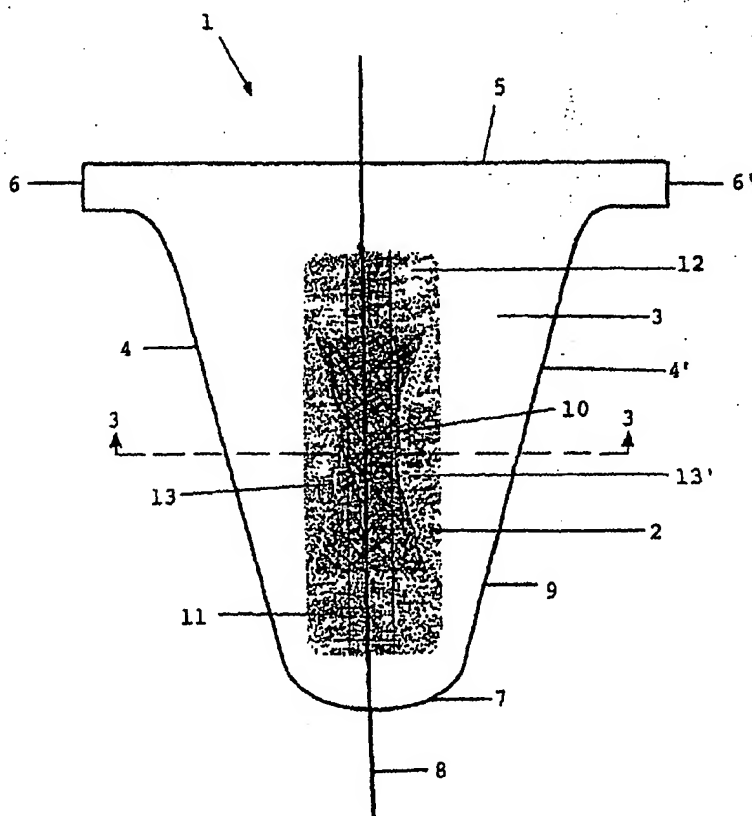
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(75) Inventors/Applicants (for US only): **VALDIVIA HER-  
NANDEZ, Francisco, Javier** [CL/BR]; Rua Heitor de  
Andrade, 501, São José dos Campos, CEP-12241-000  
São Paulo, SP (BR). **DA SILVA MACEDO, Carlos, Jr.**  
[BR/BR]; Rua Penedo, 260, Bloco 4, Apt. 16, São José dos  
Campos, CEP-12237-071 São Paulo, SP (BR). **ANDREO  
ALEDIO, Eduardo, Cesar** [BR/BR]; Rua Visconde de  
Ouro Preto, 235, São José dos Campos, CEP-12242-040  
São Paulo, SP (BR).
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230/6º andar, CEP-20031-170 Rio de Janeiro, RJ (BR).
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- (71) Applicant (for all designated States except US): **JOHN-  
SON & JOHNSON INDÚSTRIA E COMÉRCIO  
LTDA.** [BR/BR]; Rua Gerivativa, 207, CEP-05501-900  
São Paulo, SP (BR).

[Continued on next page]

(54) Title: **ABSORBENT PRODUCT**



(57) Abstract: We describe an absorbent product including a chassis (3) and an absorbent core (2) of conformable reaction in use placed on the chassis (3), the absorbent core (2) including at least one distinct and centralized region (10) of a rigidity substantially different from the rigidity presented by the front (11), rear (12) and/or side regions (13, 13') adjacent to the absorbent core (2). As advantages, the invention presents the fact that it is extremely efficient against leaks of body fluids, beside providing a comfortable use, due to the fact that this construction provides a directed and differential fold in the region between the legs, conforming it to the user's body.

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#### "ABSORBENT PRODUCT"

This invention refers to a non-returnable absorb-  
ent product, of conforming reaction for use in compressions  
5 in the region between the legs through zones of controlled  
rigidity and the fabrication method thereof.

Examples of the absorbent items that are part of  
this invention are children's and geriatric diapers as well  
as diapers against urinary incontinence and non-returnable  
10 feminine napkins, of multi-layer type, which include at  
least one layer permeable to body fluids meant for contact  
with regions of the body, one impermeable layer on the re-  
verse or external side that remains in contact with the  
clothes and one central region for body fluid absorption  
15 placed between the mentioned layers.

#### Description of the state of the art

Absorbent items of the state of the art reveal  
several attempts to improve efficiency against leaks, which  
include variations in the dosage and composition of hydro-  
20 philic and hydrophobic materials in the absorbent center and  
in the layers and various formats meant for an adjustment of  
the absorbent item to the users' outlines.

In general, the diapers' aspect is that of an  
hourglass, presenting respective rear and front regions op-  
25 posed longitudinally and linked by an intermediate region  
that includes a concentration of absorbent materials and  
structures, the intermediate region presenting side narrow-  
ing for accommodation in the region between the legs and

varying the dimensions and forms of the regions according to the manufacturer.

Of a similar conception, hygienic absorbents of the state of the art present narrowing in the intermediate region or also widening articulated in lateral regions. As  
5 attempts to resolve and/or improve deficiencies of absorption and retention of fluids in the state of the art absorbents, absorbent cores were created with lateral regions articulated by longitudinal compression lines, extremity re-  
10 gions with hydrophobic compositions, grooves or barrier lines that would confine the fluids within a central region of the absorbent with a higher fluid retention capacity, thus forming an absorption accumulator. Notwithstanding the various combinations of absorbent compositions and formats,  
15 the fluid retention capacity also depends on the size and thickness of the absorbent core and on the possibilities of assimilation of the body fluid. On the other hand, the articulation lines or grooves of the absorbent items in the region between the legs have an influence on the accommoda-  
20 tion of the absorbent item, subject to the influence of compressions and consequently reflects itself on the efficiency and on the comfort the absorbing item should provide.

In absorbent products of the state of the art, a deformation occurs, due to compression in the region between  
25 the legs of the product in use. That deformation occurs due to the pressure exerted by the curvature regions of the legs in movement and of all that region between the user's legs and regarding the user's torso, affecting the performance in

use, due to the restrictions created, such as: narrowing, breaks, padding, etc., in the body fluids' impact area. Absorbent products of the state of the art with absorbent cores, rectangular or of formats with narrowing are part of  
5 this context.

Also regarding comfort, it is advisable that the absorbent article isn't voluminous, due to the growing use of tighter clothes.

#### Objectives of the invention

10 This invention has, as one of its objectives, the provision of a non-returnable absorbent product, preferably a diaper or a feminine napkin that includes a core of body fluid absorbent with a reaction conformable in use to the relative movement between the internal leg and intimate re-  
15 gions through differentiated rigidity zones that provide better efficiency against leaks, high power of body fluid absorption and utilization comfort.

Another objective is to obtain an absorbent item with the mentioned characteristics and qualities, which is  
20 obtained through simple fabrication processes that don't require additional or specific development equipment, thus maintaining the fabrication costs at competitive levels.

#### Brief description of the invention

The above objectives are reached by the absorbent  
25 product of this invention, which includes a multi-layer structure that includes an absorbent core and forms the body or chassis, the absorbent core presenting a conformable reaction in compression regions of the product in use. That

conformability of the absorbent product is obtained through rigidity differentials in the core between points of adjacent regions of the core regarding a non-conformable region of the core when submitted to compression during use. The  
5 rigidity differentials are obtained through weight differences of the material constituting the absorbent core, by density differentials or increased concentration of that material in that region. Another way of obtaining the rigidity differential is by the superposition of absorbent pieces  
10 that provide that rigidity differential.

Areas of the absorbent core with gradual variations are defined as zones with rigidity differentials, in a continuous way, of rigidity in selected directions of the absorbent core, which distinguish the absorbent item of this  
15 invention in relation to the state of the art items by the absence of punctual regions with bounds or scaled rigidity creating barriers to the dispersion of the fluid within the absorbing core.

Among the possible absorbent items that are part  
20 of an absorbent core pursuant to the teachings of this invention, a diaper with a substantially thin structure and with geometric dimensions and form, of the type of diapers produced with compulsory material loss tending towards zero. Diapers with different chassis formats may also incorporate  
25 the core of the characteristics of this invention.

Preferably, the absorbent core is differentially conformable in regions in the front, at the rear and adjacent to the product's compression regions and reaches dif-

ferentials or incremental variations of rigidity of at least 30%. These conformable portions are deformations responsive to pressures exerted by the circular perimeter of the legs in movement or during the user's accommodation. This rigidity differential can be increasing or decreasing depending on the comfort regions.

As advantages, the invention's core with rigidity differentials can be applied on absorbent items and diapers of little thickness, assuring a directed and differentiated conformation responsive to the product's compression. The result is a continuous adjustment to the body free from tensions, a controlled fluid diffusion and absorption extremely efficient against body fluid leaks, beside providing a comfortable utilization, due to the fact that this construction provides a directed and differentiated conformation of the product, providing adjustment and comfort during the use.

#### Brief description of the drawings

This invention shall be, hereinafter, described with more details based on a diaper with one of the possible formats, as in the performance example represented in the drawings of the figures. The figures show:

Figure 1 is an upper view of a diaper that incorporates the absorbent core of this invention;

Figure 2 is a side view of the diaper illustrated in figure 1;

Figure 3 is a cross section view of the diaper along the 3-3' cut line; and

Figure 4 is a front view of the diaper illustrated in figures 1, 2 e 3, when it is in a position of use together with the user's body.

Detailed description of the figures

5 Pursuant to the preferential achievement, figure 1 shows a diaper indicated with 1, of the type known by the specialists on the subject as diaper with compulsory material loss tending towards zero. This type of diaper owns a 2 absorbent core disposed in a 3 body or chassis outlined in  
10 the transversal direction by a pair of straight and transversally opposed 4.4' side edges, which converge in a mutual approximation and symmetrically from a 5 rear edge region endowed with 6.6' fixation extremities for the 7 distal frontal region opposed longitudinally, defining a straight  
15 trajectory with a constant inclination angle measured between one of the mentioned 4.4' side edges and the longitudinal symmetry axis and the 7 symmetry axis of diaper 1.

Body or chassis 3 is formed by a structure that includes a layer permeable to body fluids meant to remain in  
20 contact with regions of the body and not showed on the figure, a 9 impermeable layer on the reverse or external side that remains in contact with the clothes and the mentioned 2 core placed between the permeable layer not shown and the 8 impermeable layer mentioned.

25 Absorbent core 2 has the direction of its longitudinal length substantially coincident with the direction of the longitudinal length of chassis 3, and is placed in a



substantially centralized way in relation to the transversal width of chassis 3.

Absorbent core 2 presents a longitudinal region substantially distinct and centralized 10, and substantially  
5 frontal longitudinal regions 11, rear 12 or lateral 13.13' adjacent to portion 10. Portion 10 is centralized between  $1/8$  and  $5/8$  of the length of the absorbent product, presenting a rigidity differential of at least 30% from the rigidity presented by the front, rear and lateral adjacent regions. Portion 10 can present the rigidity and conformation  
10 differential with curved or diagonal lines in relation to central line 8. Evidently, centralized portion 10 can own a rigidity or smoothness differential superior to portions front 11, rear 12 or lateral 13.13' adjacent in a proportion  
15 of at least 30%, that rigidity difference being selected and determined for convenience of fabrication or utilization, as well as its width and centralization can vary, those variations being merely optional.

As the user's region between the legs normally undergoes compression with deformations that follow the geometry performed by the legs' circular perimeter, the region  
20 between the legs is defined as being 10% to 60% of the length of absorbent product 1, from the front part to the rear extremity of absorbent product 1. In this region, absorbent core 2 is placed with differentiated rigidity zones.  
25

The rigidity differential of distinct and centralized portion 10 in relation to front 11, rear 12 and lateral 13.13' adjacent regions, can be managed via weight differen-

tials of the constituting material the absorbent core, by differentials of density or increased concentration of that material in that portion. Another form of obtainment of the rigidity differential is through superposition of absorbent  
5 pieces that provide that rigidity differential. The absorbent pieces can be layers of material, as if they were individual absorbent cores, which are superposed forming a 2 absorbing core, thicker and with higher rigidity in central portion 10.

10 Variably, a 2 absorbent core can also be conceived, presenting more smoothness in distinct and centralized portion 10. Both possibilities are merely configurative variants, without that positioning causing variations in this invention's protection purpose. Also, analogically to  
15 what was commented above, the portion with highest rigidity can be localized in the front, rear or lateral regions adjacent to absorbent core 2, both possibilities being merely configurative variants, without that positioning causing variations in this invention's protection purpose.

20 In the preferential achievement shown in the figures, especially in figure 4, when the user puts on absorbent product 1, front 11, rear 12 and lateral 13.13' adjacent regions undergo a significant directed deformation due to the pressure/compressing of the region between the legs  
25 caused by the circular perimeter of the user's legs, conforming themselves to the latter's body, and distinct and centralized portion 10 remains substantially unaltered, due to its higher rigidity. Such behavior allows the front, rear

or lateral adjacent regions to function as "walls", avoiding the lateral leak of body fluids and leading those fluids to distinct and centralized portion 10, where they will be absorbed.

5           The regions of absorbent product 1 that present lower rigidity or higher smoothness allow the correct conformation of that absorbent product 1 to the user's body, with comfort and smoothness.

10           Absorbent product 1 shown in figures 1 to 4 is obtained via a process of production of non-returnable products, which basically includes the stages of:

- feeding of a first continuous sheet of flexible impermeable material;
- placement of an absorbing core 2;
- 15       -       feeding of a continuous sheet of permeable flexible material;
- placement of the fixation and closing systems;
- lamination of the components mentioned above; and
- cut of the structure.

20           Preferably, the absorbent core is constituted of traditional absorbent materials, such as cellulose pulp, super-absorbent polymers, textile fibers, cotton, turf moss, sponged materials, among others, agglomerated and with a density between  $0.15 \text{ g/cm}^3$  and  $0.50 \text{ g/cm}^3$ , with weights between  $200 \text{ g/m}^2$  and  $1,500 \text{ g/m}^2$  and thickness of 0.1cm to 1.0  
25       cm. The flexibility, measured by the ASTM D4032.82 method, can be of up to 400 g in the area of lowest rigidity and of up to 900 g in the region of highest rigidity, preferably

having a relation between the lowest rigidity and highest rigidity regions of 0.30 to 0.44. Auxiliary materials can be added to the structures to facilitate the acquisition and distribution of the body fluids, such as differentiated fabrics with resilient characteristics and hydrophilic treatment. However, again, we are dealing only with configurative possibilities and, possibly, any material that fulfills the objectives defined in the project can be used.

As advantages, the invention presents the fact that it is extremely efficient against body fluid leaks, besides providing a comfortable utilization, due to the fact that this construction provides a directed and differentiated or gradual deformation in the region between the legs, conforming it to the user's body.

A preferred example of achievement having been described, it must be understood that the purpose of this invention covers other possible variations, such as an intimate absorbent item, being limited only by the tenor of the attached claims, including therein the possible equivalents.

CLAIMS

1. Absorbent product for personal use of the type that includes at least one layer permeable to body fluids meant to remain in contact with regions of the body, one impermeable layer on the reverse side and one absorbent agent between the mentioned layers, **CHARACTERIZED** in that the absorbent agent owns rigidity agents of increasing or decreasing differential variations responsive to external compression efforts.
2. Absorbent product, pursuant to claim 1, **CHARACTERIZED** in that the differential rigidity variations of the mentioned absorbent core are of at least 30% between the core' regions.
3. Absorbent product, pursuant to 1, **CHARACTERIZED** in that the absorbent core (2) presents a rigidity differential between a centralized region of the core and adjacent regions of at least 30%.
4. Absorbent product, pursuant to any of claims 1 to 3, **CHARACTERIZED** in that the rigidity differential is of at least 30%, increasingly or decreasingly.
5. Absorbent product, pursuant to claim 1, **CHARACTERIZED** in that the rigidity agents of differential variations include absorbent agents of the absorbent core with weights superior or equal to 1,500 g/m<sup>2</sup>.
6. Absorbent product, pursuant to claim 1 or 5, **CHARACTERIZED** in that the rigidity agents of differential variations include absorbent agents of the absorbent core

with a density superior or equal to  $0.15 \text{ g/cm}^3$  and inferior or equal to  $0.50 \text{ g/cm}^3$ .

7. Absorbent product, pursuant to claim 1, **CHARACTERIZED** in that the regions with lower rigidity present values of at the maximum 400 grams pursuant to method ASTM D4032.82.

8. Absorbent product, pursuant to claim 1, **CHARACTERIZED** in that the regions with higher rigidity present values of at the maximum 400 grams pursuant to method ASTM D4032.82.

9. Absorbent product, pursuant to one of claims 1, 7, 8, **CHARACTERIZED** in that the relation between the regions of lower rigidity and of higher rigidity is of 0.30 to 0.44.

10. Absorbent product, pursuant to claim 1, **CHARACTERIZED** in that the centralized region of the core presents a rigidity differentiation configuration with curved or diagonal lines in relation to the imaginary central line.

11. Absorbent product, pursuant to claim 1, **CHARACTERIZED** in that the thickness of the absorbent core is of a value of between 0.1 cm and 1.0 cm.

12. Absorbent product, pursuant to any of the previous claims, **CHARACTERIZED** in that it includes a diaper.

13. Absorbent product, pursuant to any of claims 1 to 12, **CHARACTERIZED** in that it includes an intimate absorbent item.

14. Diaper of the type that includes at least one layer permeable to body fluids meant to remain in contact with regions of the body, one impermeable layer on the reverse side and one absorbent core between the mentioned layers, with one rear edge region and one distal frontal region longitudinally opposed to an intermediate region delimited laterally by a pair of straight edges and transversally opposed, defining a straight trajectory with a constant inclination angle measured between one of the mentioned side edges and the diaper's longitudinal symmetry axis, **CHARACTERIZED** in that it includes the absorbent core such as defined in any of claims 1 to 11.

15. Fabrication process of an absorbent item such as defined in any of the previous claims, **CHARACTERIZED** by including the stages of

- feeding of a first continuous sheet of flexible impermeable material;
- placement of an absorbing core 2;
- feeding of a continuous sheet of permeable flexible material;
- placement of the fixation and closing systems;
- lamination of the components mentioned above; and
- cut of the structure.

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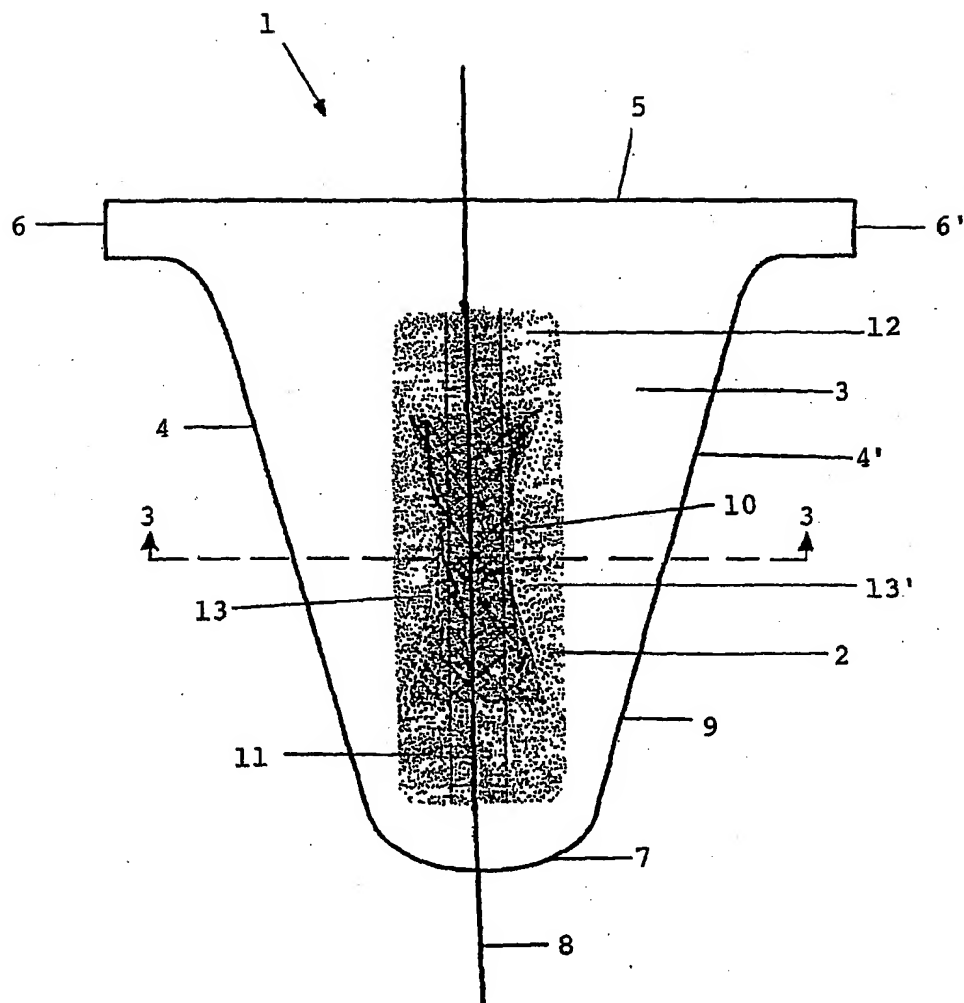


FIG. 1



2/2

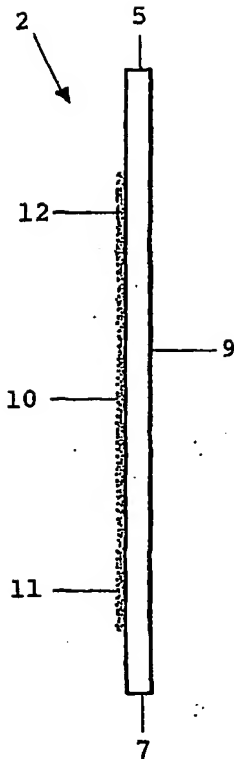


FIG. 2

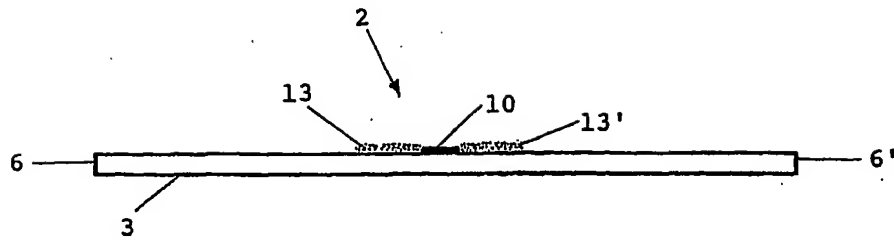


FIG. 3

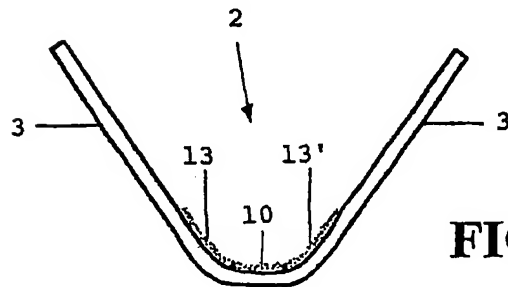


FIG. 4

## INTERNATIONAL SEARCH REPORT

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**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 A61F13/532

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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X	US 5 609 588 A (DIPALMA JOSEPH ET AL) 11 March 1997 (1997-03-11) column 16, line 63-67; claims; figures	1-15
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☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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European Patent Office, P.B. 5018 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Seabra, L

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